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Lawrence Livermore National Laboratory

# Making History...

The good news this year at Lawrence Livermore National Laboratory is that we are celebrating our 50th year of service to the nation. The Laboratory was established in 1952 to meet an urgent national security need by helping to advance nuclear weapons science and technology. The grim news for us all relates to the events of September 11, 2001, which remind us of the need for vigilance to keep the nation secure.

The security of the United States has benefited from remarkable advances in science and technology since the end of World War II. At that time, the President's Director of the Office of Scientific Research and Development, Vannevar Bush, helped to steer the nation along the course of continuing government support for long-range research and development. At Berkeley, E. O. Lawrence had created the model of how large-scale science should be pursued—through multidisciplinary team efforts. Lawrence and Edward Teller (below, left, with Herbert York) argued for the creation of a second laboratory to augment the efforts of Los Alamos.

Activities began at Livermore under the aegis of the University of California with a commitment by our first director, York, to follow Lawrence's team-science approach and be a "new ideas" laboratory. Since then, as part of the University with support predominantly from the Department of Energy (DOE) and its predecessors, Livermore has been making history and making a difference.

C. Bruce Tarter, *Director*

50th ANNIVERSARY

**In the 1950s**, Livermore made its first major breakthrough—the design of a megaton-class warhead for missiles that could be launched from highly survivable submarines. We went on to develop the first high-yield warheads compact enough that several could be carried on each ballistic missile. Further improvements in weapons safety, security, and performance were made in subsequent decades. And, in the past year, we successfully completed a life-extension program to keep the nation's most modern ICBM warhead, the W87, part of the U.S. strategic arsenal well into the 21st century. Also, when the Laboratory opened, we started to explore the feasibility of civilian fusion energy. That quest will come one step closer to fruition through future experiments in the National Ignition Facility.

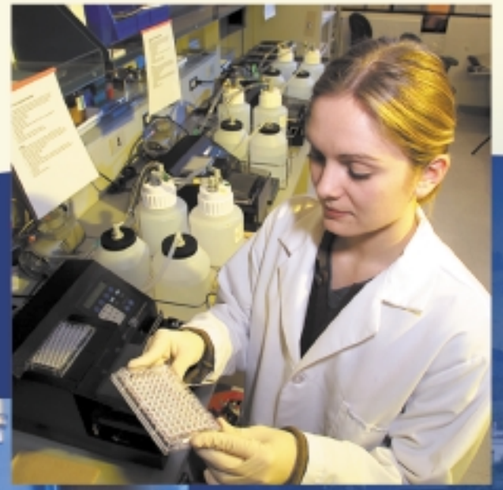
**In the 1960s**, nuclear testing—including exploration of the peaceful use of nuclear explosives—spawned environmental and bioscience programs at Livermore. Environmental programs have led to novel groundwater remediation technologies in use at Superfund sites, models that are contributing to understanding the human impact on global climate change, and the establishment of the National Atmospheric Release Advisory Center (NARAC) at Livermore. Biotechnology developments at Livermore and Los Alamos, such as chromosome biomarkers and high-speed-flow cell sorters, enabled DOE to launch its Human Genome Initiative in 1986. That initiative grew to become an international effort that completed the draft sequence of the human genome in 2000. Our bioscience program is now assisting national efforts to combat the threat of bioterrorism. Also contributing is our international assessments program, which was established in the 1960s to support the intelligence community.

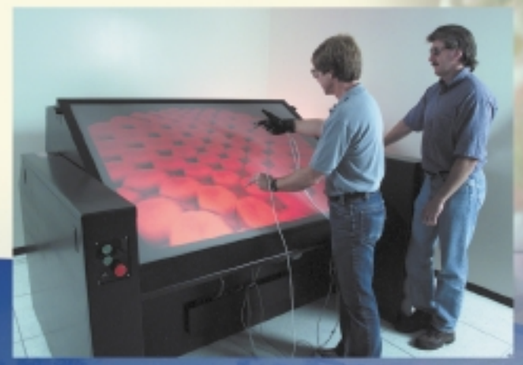
**In the 1970s**, Livermore began a laser program, and the Laboratory has been at the forefront of laser science and technology ever since. A sequence of ever-larger lasers to explore inertial confinement fusion has led to construction of the National Ignition Facility (NIF), which will provide essential support to our national security mission. Like its predecessors, NIF will enable new scientific discoveries and is stimulating the development of new products and processes in U.S. industry. The energy crisis in the 1970s also invigorated energy research programs at the Laboratory, which are part of the government–industry partnership to develop long-term reliable, affordable, clean sources of energy.

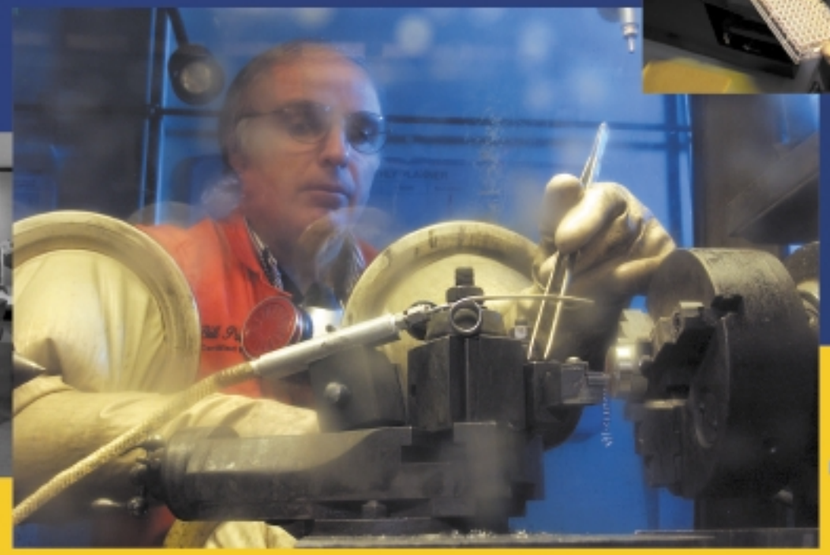
**In the late 1980s**, Livermore researchers began to explore the feasibility of using massively parallel processors for scientific computing. For five decades, the need for ever more powerful simulations for nuclear weapons design has guided industry's development of supercomputers. Livermore frequently has been home to "serial number one" of new computers, and we have helped industry make prototype machines ready for a wider range of users. Now massively parallel processing is central to the Advanced Simulation and Computing (ASCI) program, which is a key component of efforts to maintain the nation's nuclear weapons stockpile. "Terascale" computing is also offering unprecedented opportunities for scientific discovery.

**In the 1990s**, the two major thrusts of our national security mission emerged from the end of the Cold War. Livermore helped DOE to define the Stockpile Stewardship Program, which is ensuring the safety, security, and reliability of the nation's nuclear deterrent in the absence of nuclear testing. We are a key participant in the program and home to unique capabilities for the effort, such as the ASCI White supercomputer and NIF. In addition, in 1991, Livermore expanded its intelligence-support, arms control, and emergency response efforts to create a program focused on an emerging threat—proliferation and use of weapons of mass destruction by terrorists or a nation state. Our expertise and ongoing research, prototype development, and field testing enabled Livermore to respond quickly to the events of September 11. The Laboratory's tools and systems are contributing to homeland security. We will develop even more advanced tools and technologies to cope with increasingly sophisticated threats the nation will face in coming decades.

Our accomplishments in 2001 and our many achievements in 50 years of service to the nation are highlighted in this annual report. Together, they are a credit to the Laboratory's dedicated employees—past and current—and they illustrate the important role of a national laboratory, "making history, making a difference." At Livermore, we are ensuring national security and applying science and technology to the important problems of our time.







# ...Making a Difference

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